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Synthesis of Sialic Acid Derivatives and Their Immune Cells Modulation

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Abstract

The exterior cell surfaces of macrophages express a dense layer of glycans which are often terminated by sialic acid. Sialic acid is an acidic monosaccharide whose presence on the terminal ends of glycans affects cellular function and properties. In particular, due to its hydrophilic and electronegative features, SAs play important roles in both physiological and pathological processes, such as in regulating cellular interactions with ligands, microbes and neighboring cells and in controlling cellular activation, differentiation, transformation and migration. In this study two sialic acid derivatives were synthesized and characterized, the 5 amine derivative and the 9 amine derivative. This study proposes that by treating cells with amine derivates of sialic acid it is possible to modify the native sialic acid expressed on the cell surface of macrophage, also known as sialylation status and its functionality accordingly. In the studies, the quantification of sialic acid were conducted by using both LC-MS/MS. We also hope to find information regarding the specific mechanisms that are involved in sialic acid binding events as well as possible cellular consequence due to sialic acid binding events. By modifying the sialylation status of macrophage cells it may eventually be possible to modify cellular functions and properties.